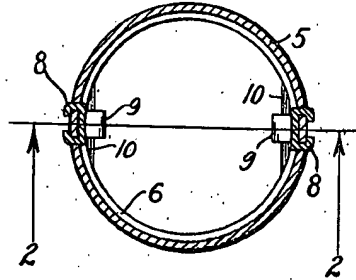


J. H. JACOBS.  
JOINT AND LOCKING MEANS FOR STOVEPIPES.  
APPLICATION FILED JULY 2, 1917.

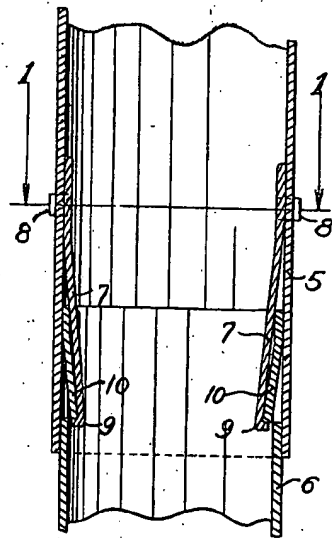
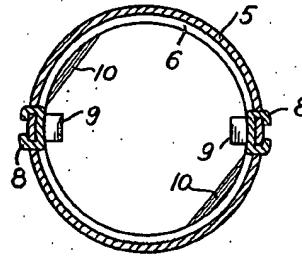
1,301,565.

Patented Apr. 22, 1919.

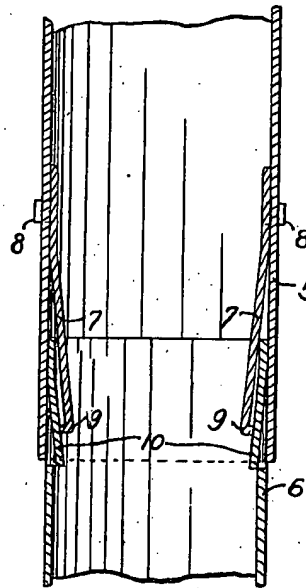
*Fig. 1.*



*Fig. 3.*



*Fig. 2.*



*Fig. 4.*

Inventor  
Joseph H. Jacobs.

BY

*Attest*  
*[Signature]*  
Attorney

THE NORMAN PETERS CO. PHOTO-LITH. WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

JOSEPH H. JACOBS, OF DENVER, COLORADO.

JOINT AND LOCKING MEANS FOR STOVEPIPES.

1,301,565.

Specification of Letters Patent.

Patented Apr. 22, 1919.

Application filed July 2, 1917. Serial No. 178,103.

*To all whom it may concern:*

Be it known that I, JOSEPH H. JACOBS, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Joints and Locking Means for Stovepipes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in stove pipe construction, and more particularly to the means for connecting the joints or sections of the pipe. My object is to provide improvements of the character indicated which shall increase the facilities with which the aforesaid functions may be accomplished.

Having briefly outlined my improvements I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof. In this drawing:

Figure 1 is a cross-section of the pipe illustrating my improved joint construction. This is a section taken on the line 1—1, Fig. 2 looking in the direction of the arrow.

Fig. 2 is a longitudinal section taken through my improved joint on line 2—2, Fig. 1, the two sections being shown in the locked position.

Fig. 3 is a cross section of the pipe illustrating the parts of the joint after they have been moved to a position to permit their disconnection.

Fig. 4 is a longitudinal section illustrating the position of the parts as they are being moved into locked position.

The same reference characters indicate the same parts in all the views.

Referring first to the means for connecting the stove pipe sections, let the numerals 5 and 6 designate the two sections of the pipe. The section 5 carries spring-actuated locking pawls 7 which consist of leaf springs having integral lips 8 which pass through openings formed in the pipe section, said

lips being clenched or bent down on the outside of the section. Within the section these pawls extend considerably beyond the fastening lips 8, their free extremities being bent outwardly, as shown at 9, to engage inwardly bent parts 10 of the companion section 6. These parts 10 are formed by slitting the section 6 a short distance from its extremity, said slits extending away from the extremity, the two slits of each part being connected by a third slit which extends in a circumferential direction, the first named slits being parallel with the axis of the pipe. After the formation of these slits, the parts 10 are pressed inwardly and will maintain the position best shown in Figs. 2 and 4, whereby as the free end of the section 6 is inserted in the corresponding end of the section 5, the parts 10 will pass outside of the free extremities of the pawls 7, which will be forced inwardly during the inward movement of the section 6 until the free extremities 9 of the pawls pass the free extremities of the inwardly bent parts 10. The action of the pawls 7 and the parts 10 during the inward movement of the part 6 is well illustrated in Fig. 4. After the pipe sections are interlocked, as shown in Fig. 2, in order to disconnect them, it is only necessary to give one of the sections, as 6, a partial rotary movement within the part 5, said movement being of sufficient magnitude to move the inwardly bent parts 10 circumferentially beyond the hook-shaped extremities 9 of the pawls. This position is illustrated in Fig. 3. As soon as this is done, the two parts may be readily disconnected, as will be readily understood.

What I claim is:

Locking means for stove pipes comprising in combination with two telescoping pipe sections, an interiorly located pawl, one end of which is secured to one pipe section, while the other end is outwardly offset, the other section having a part bent inwardly forming an opening and arranged to interlock with the outwardly offset end of said pawl, said opening adapted to be exteriorly closed by the telescoping part of the other section.

In testimony whereof I affix my signature.  
JOSEPH H. JACOBS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



US006238361B1

(12) **United States Patent**  
Poirier

(10) Patent No.: **US 6,238,361 B1**  
(45) Date of Patent: **May 29, 2001**

(54) **TRACTION AND ABDUCTION APPARATUS  
FOR TREATING THE LEGG-CALVES  
PERTHES DISEASE**

(76) Inventor: **François Poirier**, 210, rue St-Francois  
Ste-Pie-de-Bagot Québec (CA), J0H  
1W0

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/379,374**

(22) Filed: **Aug. 23, 1999**

(51) Int. Cl.<sup>7</sup> ..... **A61F 5/00**

(52) U.S. Cl. .... **602/33; 606/241**

(58) Field of Search ..... **602/23-25, 28-29,**  
**602/37-36, 39; 128/882; 606/237, 240,**  
**241, 244; 5/621, 624, 648-651; 482/907**

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*Primary Examiner*—Mickey Yu

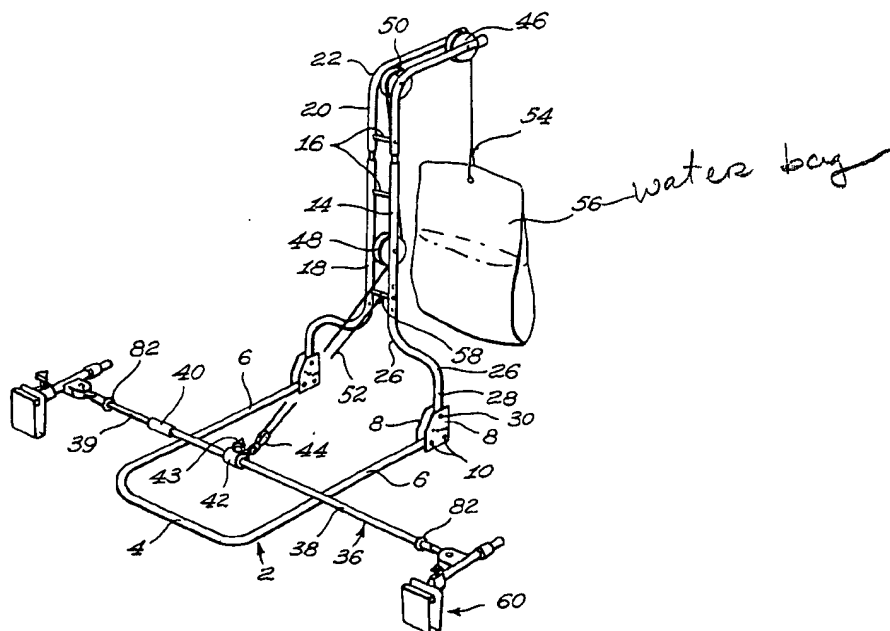
*Assistant Examiner*—Denise Pothier

(74) *Attorney, Agent, or Firm*—Francis Martineau

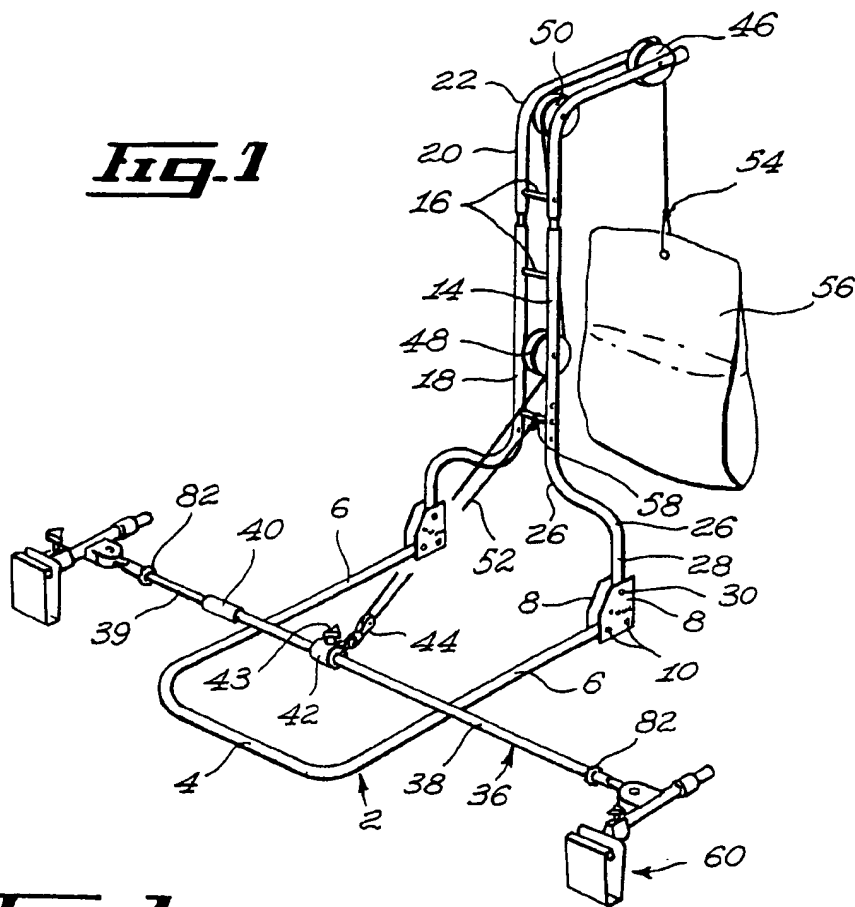
(57) **ABSTRACT**

An orthopedic apparatus for treating a child afflicted with the Legg Calves Perthes disease. The apparatus includes a telescopic cross-bar adapted to be attached at each ends to the feet of a patient's resting on a bed, to keep his legs spread apart. A post upstands from the foot of the bed and carries pulleys; a rope is trained on the pulleys and is connected at one end to the center of the cross-bar while a weight is attached to the other end of the rope. A constant pull is exerted on the patient's legs while the legs are kept spread apart. The amounts of pull and of leg spread are both adjustable. The present apparatus is destined to be used mainly at the child's home, but only shortly at the hospital, under the supervision of the parents. This apparatus is foldable and is easily carriable in a relatively small case.

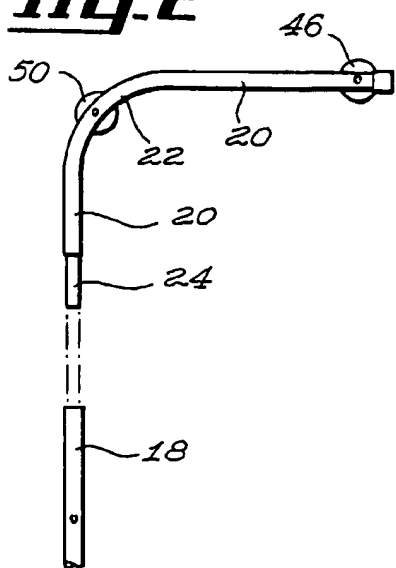
**7 Claims, 2 Drawing Sheets**



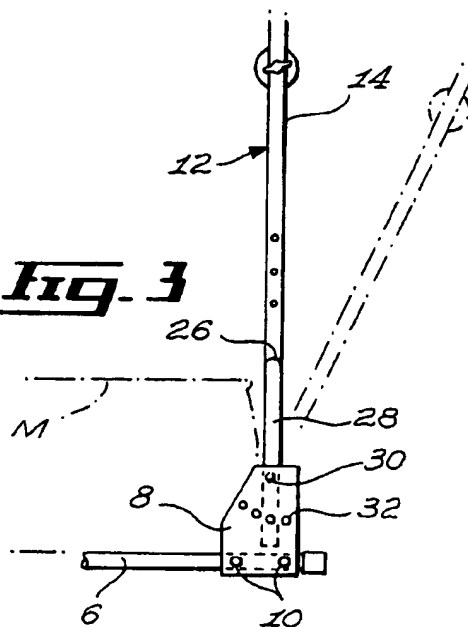
**Fig. 1**

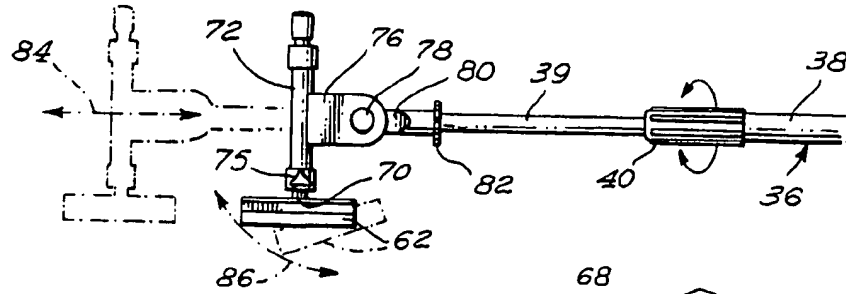


**Fig. 2**

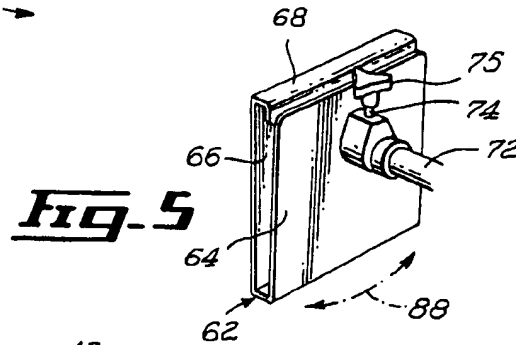


**Fig. 3**

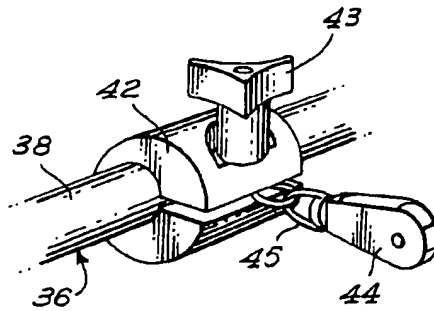




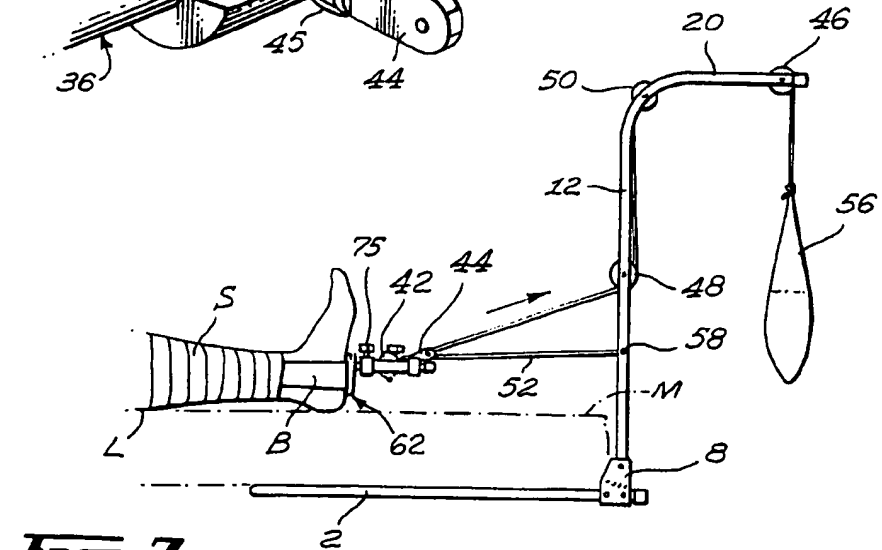
**Fig. 4**



**Fig. 5**



**Fig. 6**



**Fig. 7**

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# TRACTION AND ABDUCTION APPARATUS FOR TREATING THE LEGG-CALVES PERTHES DISEASE

## FIELD OF THE INVENTION

The present invention relates to an orthopedic apparatus for treating children suffering from the Legg Calves Perthes disease. This disease affects the hips of children and more particularly the joint between the hip bone and the thigh bone. The head of the thigh bone and the cartilage between this head and the acetabulum disintegrates. The acetabulum is the cavity in the hip bone in which the head of the thigh bone fits.

## BACKGROUND OF THE INVENTION

Previous treatment for the Legg Calves Perthes disease usually consists of placing each leg of the patient in a cast, both legs held in abduction and internal rotation by a cross-bar extending between the two casts. This system immobilises the patient in a particular position for a long time. Due to the young age of the patients and the restlessness thereof associated with young age and the uncomfortable prospect of remaining several weeks in bed doing nothing, the treatment is often only partly applied and thus not fully successful. The reason for this unsuccessful treatment with conventional apparatuses is that the young patient will tend to voluntarily release relatively frequently the cross-bar from themselves, since it is physically possible for them to reach out to this cross-bar from their bed-laying condition. Indeed, the young patient, not being fully conscious at that age (usually around 10 years old) that for the treatment to be successful, constancy in the leg pulling action thereof during the several weeks long treatment period is a prerequisite.

Leg pulling apparatus are known such as the one described in U.S. Pat. No. 1,021,688 issued Mar. 26, 1912 entitled "LEG PULLING APPARATUS" by the inventor L. J. Le Jeune. This apparatus exerts an adjustable traction on the patient's legs but does not provide any abduction, namely drawing away from the median line of a bone or muscle from an adjacent part or limb.

## OBJECTS OF THE INVENTION

It is therefore the main object of the present invention to provide an improved orthopedic device for treating the Legg Calve Perthes disease, in which the patient's legs are both pulled and spread apart from one another.

Another object of the present invention is to provide an apparatus of the character described in which the legs can be progressively spread apart from one another during the treatment and the pulling force gradually increased.

Another object of the present invention is to provide an apparatus of the character described which is foldable and is of light construction so as to be easily be carried from one place to another.

Another object of the present invention is to provide an apparatus of the character described which can be quickly and easily set up at the foot of a patient's bed.

## SUMMARY OF THE INVENTION

This invention is directed to an orthopedic apparatus for treating the Legg Calves Perthes disease, which comprises a patient's leg spreading bar, attachment devices carried by the ends of said bar for attaching said bar to patient's legs and keeping them spread apart and a leg pulling system, to

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exert constant pull on the center of said bar in a direction away from said patient, and preferably generally within the sagittal plane thereof.

Preferably, the bar is formed of telescopic sections and includes a tightener to releasably lock said sections in telescopically adjusted position.

Preferably, the system includes a collar slidably surrounding said bar and a collar tightener to tighten said collar in longitudinally adjusted position on said bar.

Preferably, the attachment devices include plates sized to be applied flat against the soles of the patient's feet, a universal pivot releasably connecting said plates to said ends of said bars and locking devices releasably locking said plates in adjusted inclined position relative to said bar.

Preferably, each of said attachment devices includes a U-shape traction plate forming two spaced apart plate sections to receive a bandage attached to a patient's leg, one of said plate sections having an intumed lip to retain said bandage between said plate sections.

Preferably, the leg pulling system comprises a post, vertically spaced upper and lower idle pulleys carried by said post, a rope passing over said pulleys having a first and a second rope end portion, said first rope end portion hanging from said upper pulley, a weight attached to said first rope end portion, said second rope end portion connected to said patient's leg spreading bar at the center thereof.

Preferably, said leg pulling system further includes a flat base frame adapted to be inserted under the mattress of a bed with said post upstanding therefrom at the foot of said mattress.

Preferably, said post is pivotally connected to said base frame and a locking device locks said post at an adjusted angle relative to said base frame.

Preferably, said base frame has a U-shape defining a bight and two spaced apart legs, said post formed of two spaced parallel members and cross bars rigidly interconnecting said spaced parallel members, said pulleys being rotatably carried by said spaced parallel members and located between the same.

Preferably, said post has an upright lower portion and an upper cantilever portion making a general right angle with said lower portion, said upper pulley carried by said cantilever portion, said lower pulley carried by said lower portion.

Preferably, said weight includes a flexible waterproof bag to hold water.

Preferably, said lower portion and said cantilever portion are detachable from each other.

The invention also relates to a method of use of an orthopedic apparatus for treating the Legg-Calves Perthes disease, the apparatus of the type comprising a patient's leg spreading telescopic bar, leg attachment devices carried by each end of said bar for attaching said bar to the patient's legs and keeping them spread apart and a leg pulling system including a support post to exert a constant pull on the center of said bar in a direction away from said patient, the method comprising the following steps:

inserting said base frame at the foot of a bed under the bed mattress, with the post upstanding from the foot end of the bed at an adjusted inclined position;  
attaching each leg attachment device to a respective patient's leg under the foot,  
adjusting the overall length of the legs spreading bar to the patient's size; and

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progressively increasing the overall length of the legs spreading bar during the duration of treatment, while concurrently recentering the telescopic bar so that the pulling force remain generally within the patient's sagittal plane, each time the overall length of the telescopic bar is changed.

### BRIEF DESCRIPTION OF THE DRAWINGS

In the annexed drawings, wherein like reference characters indicated:

FIG. 1 is a perspective view of the apparatus in accordance with the invention, with the weight consisting of a flexible pouch filled with water;

FIG. 2 is a partial side elevation of the post made of a lower upright portion and an upper cantilever portion;

FIG. 3 shows in full line a partial side elevation of post and base frame inserted under a bed mattress and suggesting in phantom lines how the post can be adjustably inclined;

FIG. 4 is a top plan view of one end portion of the telescopic, leg spreading cross-bar, suggesting in phantom lines the telescopic extension capability thereof;

FIG. 5 is an enlarged partial perspective view of one of the leg attachment device at each end of the cross-bar;

FIG. 6 is a partial perspective view of the central collar on the cross-bar, at an enlarged scale; and

FIG. 7 is a side elevation of the apparatus in operative position, showing a patent leg pulled horizontally by the present apparatus.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The apparatus of the invention comprises a base frame 2 formed of a tubular member having a U-shape defining a bight 4 and two parallel, spaced legs 6 fitted at each free end with a pair of upright plates 8, 8, secured thereto by rivets 10.

The apparatus further includes a post 12 formed of two spaced, parallel, tubular members 14 interconnected by cross-bars 16. The post define a lower upright portion 18 and a separate upper cantilever portion 20. Cantilever portion 20 has an intermediate rectangular bend 22. Portions 18 and 20 are releasably joined together by a reduced diameter joining end portion 24 as shown in FIG. 2. The lower portion 18 forms for each member 14 a double bend 26 ended by a free end portion 28 which is pivoted at 30 between the two plates 8. These plates have a series of holes 32 concentric with the pivot 30 as shown in FIG. 3 for receiving a locking pin to adjustably lock the post 12 in a desired inclination as shown in FIG. 3.

A leg spreading bar 36 is provided in accordance with the present invention. This bar 36 is composed of two telescopic sections 38, 39 adjustably fitted one into the other and tightened in adjusted position by a tightener 40 of conventional construction.

A split collar 42, provided with a collar tightener 43 as shown in FIG. 6, is slidably fitted on one of the telescopic section 38 adjusted and secured centrally of the bar 36 by means of a collar tightener 43. A return pulley 44 is attached to collar 42 by means of chain link 45 attached to the bolt of the tightener 43. An upper pulley 46, a lower pulley 48 and an intermediate pulley 50 are mounted on post 12, being freely rotatable on cross-pins at the outer end of the cantilever portion 20, on the lower portion 18 and at the bend 22 of the cantilever portion 20 respectively.

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A flexible rope 52 is trained on the pulleys 44, 46, 48 and 50. The rope 52 has a first end 54 depending from pulley 46 and attached to a flexible waterproof bag 56 designed to hold an adjusted quantity of water. The bag can be emptied after each treatment, if so desired, for measured water volume refill. The second end 58 of the rope 52 is attached to the lowermost cross-bar 16 after have been trained on the return pulley 44.

Leg spreading cross-bar 36 carries at each end, a patient's leg attachment device 60. Each device comprises a U-shape plate 62 sized to be applied flat against the sole of the patient's foot L and including an inner plate section 64 and an outer plate section 66, the latter being fitted with an inturned lip 68 at its outer edge as shown in FIGS. 4 and 5. The inner plate section 64 is fixed to a center rod 70 fitted within a sleeve 72 so that U-shape plate 62 can be rotated with respect to sleeve 72 and locked in adjusted position by means of a bolt 74 having a knob 75.

Sleeve 72 has a side leg 76 which is pivoted at 78 to outer end 80 of bar 36. A knurled collar 82 surrounds and is fixed to outer end 80.

It follows that the two U-shape plates 62 can be spread apart more or less from each other in accordance with double arrow 84 of FIG. 4, and pivoted about pivots 78 so as to be in diverging or converging condition with respect to each other in accordance with double arrow 86 in FIG. 4.

Finally, the rotational position of each U-plate 62 can be changed in sleeve 72 and set by bolt 74 in accordance with double arrow 88 shown in FIG. 5.

The apparatus of the invention is used as follows:

The base frame 2 is first inserted at the foot of the bed under the mattress M with the post 12 upstanding from the foot end of the bed at an adjusted inclined position as shown in FIG. 3.

Then, each U-shape plate 62 is attached to the respective patient's leg L under the foot, by means of a bandage B and a strapping S in usual manner, with the bandage prevented from accidental removal from its intended place between the two plates sections 64 and 66 due to the presence of the lip 68. Moreover, since lip 68 is located against the underface sole of the child's foot, i.e. away from the hands of the young bed-laying patient, the latter will not be able by himself/herself to reach out and voluntarily release the present apparatus from his/her bed laying position. Only a medical staff personnel or other supervisory parental authority will be able to reach out to the patient's foot sole from ahead of the bed mattress—a much improved guarantee of thorough leg pulling treatment.

The overall length of the legs spreading bar 36 is thereafter adjusted to the patient's size and also progressively increased during the treatment, which can last several months. Each time the overall length of the telescopic bar 36 is changed, the collar 42 is repositioned to be at the center of the bar 36, that is mid-way between the two U-shaped plates 62. The angular position of these plates 62 in all direction can be adjusted so as to impart suitable rotation of the patient's legs L with respect to one other. While the legs are kept spread apart, a gentle pull is exerted on the cross-bar 36 by means of the pulling device including the rope 52 and water filled bag 56. The amount of water in bag 56 can be progressively increased or decreased in accordance with the protocol of the treatment.

Since the apparatus of the invention is designed to be used at home, under the supervision of the treated child's parents

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or of visiting medical personnel, the apparatus is foldable and can be carried in a relatively small case. It is also light weight and the water bag can be emptied of water after each treatment.

I claim:

1. An orthopedic apparatus for treating the Legg-Calves Perthes disease comprising:

A patient's leg spreading bar,

leg attachment devices carried by each end of said bar for attaching said bar to the patient's legs and keeping them spread apart,

a leg pulling system mounted on the center of said leg spreading bar to exert a constant pull on the center of said bar in a direction away from the patient; said leg pulling system comprising a post, vertically paced, upper and lower idle pulleys carried by said post, a rope passing over said pulleys and having a first and a second rope end portion, said first rope end portion hanging from said upper pulley, a weight attached to said first rope end portion, said second rope end portion connected to said patient's leg spreading bar at the center thereof, wherein said constant pull on the center of the bar is in a direction generally within the patient's sagittal plane;

a flat base frame, said post secured to and upstanding from said base frame, said base frame adapted to be inserted under the mattress of a bed with said post upstanding therefrom at the foot of the mattress; said post being pivotally connected to said base frame;

and a locking device to lock said post at an adjusted angle relative to said base frame;

wherein said base frame has a U-shape defining a bight and two spaced apart legs, said post formed of two spaced parallel members and cross bars interconnecting, said spaced parallel members, said pulleys being rotatably carried by said spaced parallel members and located between the same.

2. An orthopedic apparatus as defined in claim 1,

wherein said post has an upright lower portion and an upper cantilever portion making a general right angle with said lower portion, said upper pulley carried by said cantilever portion, said lower pulley carried by said lower portion.

3. An orthopedic apparatus as defined in claim 1,

wherein said weight includes a flexible waterproof bag to hold water.

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4. An orthopedic apparatus as defined in claim 3,

wherein said leg spreading bar is formed of telescopic sections and further including a tightener to releasably lock said telescopic sections in telescopically adjusted position, a collar slidably surrounding said telescopic bar, a collar tightener to tighten said collar in adjusted position centrally of said leg spreading bar and a return pulley carried by said collar on which said second rope end portion is trained and secured to one of said cross bars.

5. An orthopedic apparatus as defined in claim 4,

wherein said lower portion and said cantilever portion are detachable from each other.

6. An orthopedic apparatus as defined in claim 5, wherein each of said attachment devices includes a U-shaped traction plate defining two spaced plates sections to receive a bandage attached to a patient's leg, one of said plate sections having an intumed lip to retain said bandage between said plate sections.

7. A method of use of an orthopedic apparatus for treating the Legg-Calves Perthes disease, the apparatus of the type comprising:

a base frame,

a patient's leg spreading telescopic bar;

leg attachment devices carried by each end of said bar for attaching said bar to the patient's leg and keeping them spread apart; and

a leg pulling system including a support post adjustably pivoted to said base frame to exert a constant pull on the center of said bar in a direction away from said patient, the method comprising the following steps:

inserting said base frame at the foot of a bed under the bed mattress, with the post upstanding from the foot end of the bed at an adjusted inclined position;

attaching each leg attachment device to a respective patient's leg under the foot;

the adjusting the overall length of the legs spreading bar to the patient's size; and

progressively increasing the overall length of the legs spreading bar during the duration of treatment, while concurrently recentering said leg spreading telescopic bar so that the pulling force remain generally within the patient's sagittal plane, each time the overall length of the telescopic bar is changed.

\* \* \* \* \*



[54] SNAP-FIT LUBRICANT PICK-UP TUBE FOR A MOTOR COMPRESSOR

[75] Inventor: James L. Douglas, Adrian, Mich.

[73] Assignee: Tecumseh Products Company, Tecumseh, Mich.

[21] Appl. No.: 961,104

[22] Filed: Nov. 16, 1978

[51] Int. Cl.<sup>2</sup> ..... F04B 39/02

[52] U.S. Cl. .... 184/6.16; 285/319; 415/88; 417/372; 417/902

[58] Field of Search ..... 184/6.16; 417/902, 372; 415/88; 285/319, DIG. 22

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Primary Examiner—David H. Brown

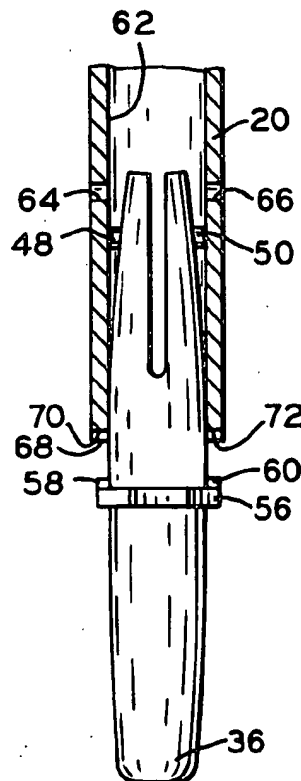
Attorney, Agent, or Firm—Albert L. Jeffers; John F. Hoffman

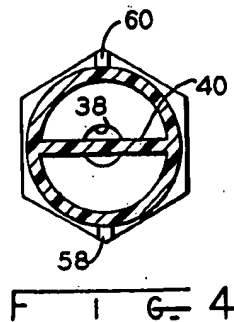
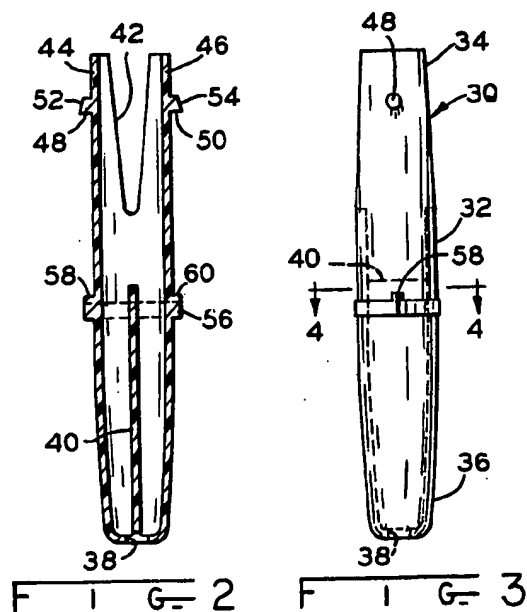
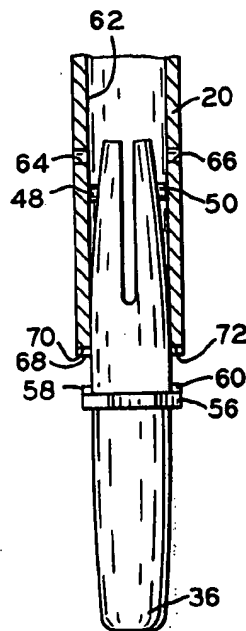
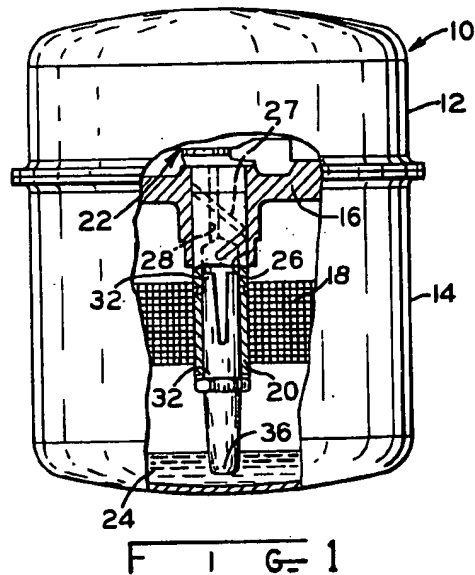
[57]

ABSTRACT

A lubricating device for use in hermetic compressors and the like wherein a rotating oil pick-up tube is partially immersed in the oil in the compressor sump, and pumps the oil upwardly by means of centrifugal action to the compressor parts which are to be lubricated. The compressor includes a vertical shaft to which the pick-up tube is connected, wherein the shaft has an open hollow lower end including a pair of locking openings in the inner surface of the hollow portion. A molded plastic oil pick-up tube, which is bifurcated at one end so as to form a pair of resilient locking arms, is inserted into the shaft until a pair of locking nibs snap into the corresponding locking openings. In order to properly orient the pick-up tube about its axis so that the locking nibs are aligned with the corresponding openings, a pair of protruding locking ears on the tube are axially aligned with a pair of corresponding slots in the lower edge of the shaft.

12 Claims, 5 Drawing Figures





## SNAP-FIT LUBRICANT PICK-UP TUBE FOR A MOTOR COMPRESSOR

### BACKGROUND OF THE INVENTION

The present invention relates to a centrifugal lubricant pick-up tube of the type suitable for use in hermetic motor compressors, and in particular to such a tube which is capable of being snap fit into the compressor shaft so as to facilitate assembly.

In hermetic motor compressors, which are sealed units, the bearing regions are often lubricated by means of a lubricant pick-up tube, which is rotated about its longitudinal axis and has one end immersed in the compressor lubricant sump. The tube is mounted on the shaft of the compressor and exerts a centrifugal pumping action on the lubricant which flows through the lower open end of the tube. The tube propels the lubricant upwardly by means of centrifugal action to passageways in the shaft, which leads to the bearing regions of the compressor. Such pick-up tubes are disclosed, for example, in U.S. Pat. Nos. 3,451,615, 3,410,478 and 4,079,185.

In the past, such pick-up tubes have often been made of deep draw quality cold rolled steel, wherein sheet steel is die blanked into a circular disc and then progressively drawn first into a cup shape and then, in subsequent draws, into an elongated, generally cylindrical tube of uniform diameter. The final shape for the tube is accomplished by subsequent forming operations, including drawing, swaging, and piercing. The tube may be provided with a copper flash finish, if desired. The tube is then removably or permanently press-fit in the compressor shaft.

The obvious disadvantage to such a pick-up tube lies in the number of operations which are necessary to form it. Furthermore, the operation of assembling it to the compressor shaft by a press fit requires the use of special machinery.

### SUMMARY OF THE INVENTION

The present invention overcomes the disadvantages of the prior art centrifugal oil pick-up tube lubricating devices by providing a pick-up tube made of integral molded plastic, which can be manually inserted into the compressor shaft and snap fit in place. Such an arrangement results in substantial savings in manufacturing costs for the tube itself and, additionally, simplifies the assembling operation by eliminating the necessity for specialized press-fit machinery.

Specifically, the present invention relates to a lubricating device for use in a hermetic compressor comprising a shaft adapted to be rotated vertically in the compressor and rotated about its longitudinal axis, wherein the shaft has an open, hollow, lower end terminating in a lower edge and an inner surface extending upwardly from the lower edge including, at least one locking opening therein. A lubricant pick-up tube having an inlet opening at one end and an outlet opening at the other end is bifurcated along said other end, with the furcations forming a pair of resilient locking arms, both of said arms having a projecting locking nib thereon. The pick-up tube is inserted into the compressor shaft with the locking nibs being snap fit in the corresponding locking opening so as to lock the pick-up tube in place.

The method according to the present invention comprises the steps of: providing a depending shaft in the compressor rotatable about its longitudinal axis by the

compressor, wherein the shaft includes an open hollow lower end with an internal inner surface and a locking opening therein, providing a centrifugaltype lubricant pick-up tube bifurcated at one end along its longitudinal axis, with the furcations forming a pair of resilient locking arms, and having a locking nib on both of the arms, inserting the two locking arms into the shaft lower end with the arms being deflected inwardly by the shaft inner surface, and radially aligning the locking nibs and opening whereupon the locking nibs snap into the locking opening as the arms spring outwardly, thereby locking the tube in place.

It is an object of the present invention to provide a lubricating device for use in hermetic compressors, which is made of a resilient plastic material, and may be locked to the compressor shaft by means of a snap fit.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view, partially broken away, of a hermetic motor compressor unit incorporating the pick-up tube of the present invention;

FIG. 2 is a longitudinal sectional view of the pick-up tube;

FIG. 3 is an elevational view of the pick-up tube shown in FIG. 2 turned 90° on its longitudinal axis;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary elevational view of the compressor unit and pick-up tube, wherein the pick-up tube is shown partially inserted into the compressor shaft.

### DETAILED DESCRIPTION

Referring now to the drawings in detail and in particular to FIG. 1, hermetic compressor motor unit 10 comprises an outer casing having upper and lower shells 12 and 14, and a cast frame 16, the upper end of which embodies the compressor proper, which may be of the piston-cylinder type. At the lower end of frame 16, is located a motor having a rotor 18 connected to shaft 20, which is the shaft by which the compressor 22 is driven.

In the bottom of lower casing shell 14 is contained liquid 24 comprising a refrigerant fluid and a lubricating fluid. This fluid 24 is propelled upwardly at least to bearing region 26 through passageway 27 and on upwardly and out the upper end of shaft 20 via passageway 28. Passageway 28 is preferably offset laterally from the axis of shaft 20.

The lubricant pick-up tube 30 according to the present invention comprises a tubular body 32 made of an injection molded thermoplastic, such as Valox 420, having an upper end 34 and tapering lower end 36, respectively. The lower end 36 has an axial opening 38 for the passage of lubricant from the compressor sump to the interior of tube 30, and a diametrically positioned impeller blade 40 extending from a point spaced approximately 0.040 inches above the inside bottom of open 38 to a point slightly above the midpoint of tube 32. Preferably, blade 40 is molded integrally with tube 32.

The upper end 34 of tube 32 is bifurcated as by a pair of V-shaped slots 42 so as to form a pair of generally parallel locking arms 44 and 46. Due to the slightly resilient nature of the material forming tube 32 and the presence of slots 42, arms 44 and 46 are resilient and can be deflected inwardly toward the longitudinal axis of tube 32. A pair of locking nibs 48 and 50 are integral with arms 44 and 46, respectively, and project radially outward therefrom. It will be noted that locking nibs 48

and 50 are generally cylindrical in shape and have end surfaces 52 and 54 which slant inwardly in the upward direction.

A hexagonal collar 56 encircles tube 32 at about the longitudinal midpoint thereof, and includes a pair of locating ears 58 and 60 extending upwardly therefrom.

Shaft 20 is hollow and open on its lower end, and has a generally cylindrical inner surface 62. A pair of locking openings 64 and 66 extend radially inward through shaft 20 and are dimensioned so as to receive locking nibs 48 and 54 in the manner which will be described below. The lower edge 68 of shaft 20 is provided with a pair of locating slots 70 and 72, which are dimensioned to receive locating ears 58 and 60.

To assemble pick-up tube 32 to compressor 22, locking arms 44 and 46 are inserted into the lower end of shaft 20, and tube 30 is pushed upwardly. Locking nibs 48 and 50 will ride over the lower edge 68 of shaft 20 thereby causing arms 44 and 46 to be deflected inwardly to the approximate positions illustrated in FIG. 5. It may be necessary to physically press arms 44 and 46 slightly inwardly as it is being inserted to permit locking nibs 48 and 46 to clear lower edge 68. Tube 30 is pushed up into shaft 20 until the locating ears 58 and 60 of collar 56 contact the lower edge 68 of shaft 20. Tube 30 is then turned on its longitudinal axis by hexagonal collar 56 until locating ears 58 and 60 align with slots 70 and 72 in shaft 20, and tube 30 is then pushed in until the locking nibs 48 and 54 snap into locking openings 64 and 66. In this position, hexagonal collar 56 will seat against lower edge 68 and the tube 30 is locked in place for operation.

While this invention has been described as having a preferred design, it will be understood that it is capable of further modification. This application is, therefore, intended to cover any variations, uses, or adaptations of the invention following the general principles thereof and including such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and fall within the limits of the appended claims.

What is claimed is:

1. A lubricating device for use in hermetic compressors and the like comprising:

a shaft adapted to be disposed vertically in the compressor and rotated about its longitudinal axis, said shaft having an open hollow lower end terminating in a lower edge,

said hollow lower end including an inner surface extending upwardly from said lower edge and further including a pair of locking openings in said inner surface,

a lubricant pick-up tube having an inlet opening at one end and an outlet opening at the other end thereof, said other end of said tube being bifurcated along the longitudinal axis of said tube, with the furcations forming a pair of resilient locking arms, an outwardly projecting locking nib on each of said arms, said locking arms being received in said shaft lower end with said locking nibs being snap fit in said locking openings,

seating means projecting outwardly from said pick-up tube adapted to abut said shaft lower edge when said tube is inserted into said shaft lower end with said locking nibs snap fit in said locking openings, and

an outwardly projecting locating ear on said tube received in a corresponding slot in said shaft lower edge, said locking nib, locking opening, locating

slot and locating ear being pre-oriented relative to each other so that said nib and locking opening will be axially aligned when said locating slot and ear are axially aligned, whereby said tube can be properly oriented when it is inserted in said shaft lower end.

2. The lubricating device of claim 1 wherein said tube consists of an integral molded plastic unit.

3. A lubricating device adapted to be snap fit in a hollow, vertically disposed shaft of a motor compressor, said lubricating device being a lubricant pick-up tube comprising: a tubular member having an inlet opening at one end and an outlet opening at the other end, said other end of said tubular member having a portion thereof being bifurcated along the longitudinal direction thereof with the furcations forming a pair of resilient locking arms, an outwardly projecting locking nib on at least one of said arms, an annular collar encircling said tube intermediate said ends, at least one locating ear extending axially away from said collar toward said other end, said locking nib and locating ear being precisely oriented with respect to each other so that when the device is inserted into the shaft, both the nib and ear will engage with respective corresponding openings in the shaft and an impeller blade disposed substantially diametrically inside the lower portion of said tube.

4. A lubricating device for use in a hermetic compressor and the like comprising:

a shaft adapted to be disposed vertically in the compressor and rotated about its longitudinal axis, said shaft having an open hollow lower end terminating in a lower edge,

said hollow lower end including an inner surface extending upwardly from said lower edge and further including a locking opening in said inner surface,

a lubricant pick-up tube having an inlet opening at one end and an outlet opening at the other end thereof, at least a portion of said other end of said tube being bifurcated along the longitudinal direction of said tube, with the furcations forming a pair of resilient locking arms,

an outwardly projecting locking nib on one of said arms,

said locking arms being received in said shaft lower end with said locking nib being snap fit in said locking openings, and

a pair of cooperating locating elements respectively on said shaft lower end and said pick-up tube, said locating elements and said locking nib and said locking opening being pre-oriented with respect to each other such that said locking opening and locking nib will be axially aligned when said locating elements are axially aligned.

5. The lubricating device of claim 4 including a second outwardly projecting locking nib on the other of said arms snap fit in a second locking opening in said inner surface.

6. The lubricating device of claim 4 wherein said pick-up tube consists of an integral molded plastic unit.

7. The lubricating device of claim 6 wherein said pick-up tube includes an impeller blade therein.

8. The lubricating device of claim 4 including seating means projecting radially outward from said pick-up tube adapted to abut said shaft lower edge when said tube is inserted into said shaft lower end with said locking nib snap fit in said locking opening.

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9. The lubricating device of claim 8 wherein said seating means includes an annular collar adapted to be seated against said shaft lower edge.

10. The lubricating device of claim 4 wherein said locating elements comprise a locating slot in the lower end of said shaft and a locating ear on said seating means received in said slot when said locking nib is received in said locking opening.

11. A lubricating device for use in a hermetic compressor and the like comprising:

a shaft adapted to be disposed vertically in the compressor and rotated about its longitudinal axis, said shaft having an open hollow lower end terminating in a lower edge,

said hollow lower end including an inner surface extending upwardly from said lower edge and further including a locking opening in said inner surface,

a lubricant pick-up tube having an inlet opening at one end and an outlet opening at the other end thereof, at least a portion of said other end of said tube being bifurcated along the longitudinal direction of said tube, with the furcations forming a pair of resilient locking arms,

an outwardly projecting locking nib on one of said arms,

said locking arms being received in said shaft lower end with said locking nib being snap-fit in said locking opening.

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a locating slot in said shaft lower edge and an outwardly projecting locating ear on said pick-up tube received in said slot,

said locking nib, locking opening, locating slot and locating ear being pre-oriented relative to each other so that said nib and locking opening will be axially aligned when said locating slot and ear are axially aligned, whereby said tube can be properly oriented when it is inserted in said shaft lower end.

12. In a compressor, the method of assembling a centrifugal lubricating device comprising:

providing a depending shaft in said compressor adapted to be rotated about its longitudinal axis by said compressor, said shaft including an open hollow lower end with an inner surface and a locking opening in said surface,

providing a centrifugal-type lubricant pick-up tube being bifurcated at one end along the longitudinal axis thereof with the furcations forming a pair of resilient locking arms, at least one of the arms including a locking nib adapted to lock together with the locking opening,

inserting the tube locking arms into the shaft lower end with the arms being deflected inwardly by the shaft inner surface,

axially aligning a pair of locating elements on the shaft lower end and the pick-up tube, respectively, and

radially aligning the locking nib and locking opening whereupon the locking nib snaps into the locking opening as the arms snap outwardly, thereby locking the tube in place.

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